Iron sights are limited by the fact that the human eye cannot bring a front sight element and target into simultaneous focus (ill. 1 and 2). However, INL s innovative MicroSight (ill. 3) uses a single miniature optical element that provides simultaneous focus on both the front sight and target.


Illustration 1


Illustration 2


Illustration 3

MicroSight

A Unique Gun Sight Innovation that Seems to Defy the Laws of Physics

Commonly used small arms such as rifles have a number of critical limitations which can be directly linked to the weapon sights. The ability to quickly acquire a target and deliver accurate fire is limited by the fact that the human eye cannot bring the front sight element and target into simultaneous focus.

Telescopic sights, and red dot or holographic sights overcome these difficulties but are heavy, bulky, and reduce the reliability of the weapon system. These telescopic, red dot and holographic sights are also very expensive.

Idaho National Laboratory's MicroSight allows the marksman's eye to focus on both the front gunsight and the intended target simultaneously. Without the MicroSight, the human eye is capable of focusing on either the front sight or the target, but not both at the same time. The MicroSight dramatically improves both firearm safety and performance by providing an enhanced sight picture. Consequently, overall performance will be improved by more precise aiming, resulting in superior accuracy when shooting.

The MicroSight provides fast target acquisition and improved hit probability at low cost and without added weight, bulk, or reduced reliability. In the United States alone, there are more than 35 million hunters and target shooters with millions more around the world that could benefit from the MicroSight's unique advantages. The MicroSight would also benefit military personnel by improving combat weapon safety

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The Energy of Innovation

Idaho National Laboratory

Continued from previous page

and performance for a small investment and no weight increase.

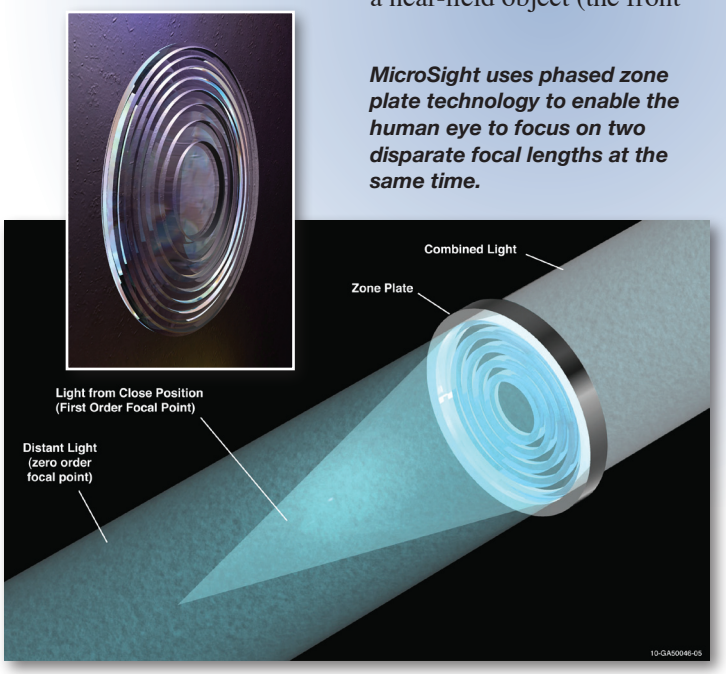
Providing clear focus on both the aiming reference and the target will allow hunters, target shooters, and military service members to be more aware of their surroundings, thereby reducing the number of errant gun shots and friendly fire incidents.

Simple Alternative

The MicroSight was invented by David Crandall, an engineer at Idaho National Laboratory and an avid competitive target shooter. Since the eye is only capable of focusing on one plane at a time, and the front sight and target are in separate planes, conventional wisdom says they both cannot be in focus at the same time. However, Crandall's research into optics revealed that zone plate technology could be used to develop a lens that enables the human eye to focus on two disparate focal planes simultaneously.

While basic zone plates include opaque rings, advanced forms called phased zone plates replace the opaque rings with transparent glass rings of varying thickness to retard the wave front thereby creating the desired interference without loss of light. This characteristic convinced Crandall that the technology could be used to develop a gunsight that would accomplish the seemingly impossible feat of enabling the shooter's eye to focus on both the front sight and the target simultaneously. This solves a visual limitation that had plagued marksmen since gunsights were invented.

The result of Crandall's work is the MicroSight, which uses the phased zone plate concept to create one focal point at a near-field object (the front sight) while simultaneously focusing at infinity (the location of the target).



MicroSight uses phased zone plate technology to enable the human eye to focus on two disparate focal lengths at the same time.

Commercialization and Benefits

Apollo Optical Systems, Inc. (AOS)—a world leader in lens design and engineering–has been granted rights under an INL patent application regarding MicroSight. AOS is currently working with various gunsight manufacturers to design specific MicroSights for various rifle applications in anticipation of release to the military, law enforcement, and competitive marksmen. These new applications will allow gun users to take advantage of a variety of benefits provided by this unique technology.

- Light weight (prototypes weigh 1/1000 oz) resulting in weapon system weight reduction of 11% or more.
- Compact (prototype OD is less than 1/4 inch).
- Passive and non-powered
- Rugged and reliable by virtue of light weight and small size.
- Low cost compared to existing technology resulting in potential cost savings of $400 to $1800 per optical sight replaced.
- Easy retrofit can be achieved within the envelope of existing iron sight systems.

For more information

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